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ABSTRACT

The purpose of this study was to compare the effects of two contextual influences (performance-contingent rewards and proximal goals) on children's task motivation, self-efficacy, and skillful performance after division skill-development training. The sample included 44 children, ranging in age from approximately 9 to 11 years, who were identified by their teachers as being low in ability to solve division problems. After measures were taken of children's perceptions of self-efficacy for correctly solving division problems and following the administration of a division-skill pretest, children were assigned to one of four treatment groups: rewards only, goals only, rewards plus goals, and training control. Children received two 45-minute training sessions over consecutive school days; during sessions, an adult proctor gave treatment instructions appropriate to the children's experimental condition, and children solved problems alone. It was predicted that children in the condition involving rewards plus goals would demonstrate the highest levels of self-efficacy and skillful performance. Results indicated that offering children performance-contingent rewards or suggesting proximal goals exerted motivational effects on problem solving and that combining performance-contingent rewards with proximal goals led to superior levels of self-efficacy and skillful performance. Results thus supported the idea that self-efficacy bears an important relationship to subsequent achievement. (RH)

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Influence of Rewards and Goals on Children's Self-Efficacy and Skills

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Abstract

This experiment compared the effects of offering performance-contingent rewards with those of proximal goals on task motivation, self-efficacy, and skillful performance. Children deficient in division skills received division instruction and solved problems. Half of the sample were offered rewards based on their actual performances, whereas the other half were not offered rewards. Within each of these reward conditions, half of the children pursued proximal performance goals; the other half received no goals. Although performance-contingent rewards and proximal goals each enhanced rate of problem solving during training, combining rewards with goals led to the highest levels of self-efficacy and skill. Results support the idea that these two contextual influences may enhance self-efficacy according to a common informational process.

Influence of Rewards and Goals on Children's Self-Efficacy and Skills

Bandura's theory of self-efficacy states that different treatments change behavior in part by creating and strengthening a sense of self-efficacy (Bandura, 1977a, 1981, 1982). Self-efficacy refers to judgments of how well one can organize and implement actions in specific situations that may contain ambiguous, unpredictable, and stressful features. Self-efficacy is hypothesized to influence one's choice of activities, amount of effort expended, perseverance when difficulties are encountered, and task accomplishments.

People acquire information about their level of self-efficacy through self-performances, socially comparative vicarious means, persuasory influences, and physiological indexes. Although self-performances provide the most reliable efficacy information, efficacy judgments are not isomorphic reflections of those performances. Efficacy appraisal is an inferential process that involves weighting the relative contributions of both ability and nonability factors, such as self-perceptions of ability, amount of effort expended, task difficulty, amount of external aid received, situational circumstances under which the performances occurred, and temporal pattern of successes and failures (Bandura, 1981, 1982).

Although self-efficacy theory originally was employed to explain coping behaviors in fearful situations, subsequent research has extended this framework to other contexts, including children's learning of cognitive skills (Schunk, 1981, 1982, in press-a). This latter research, which has explored how children acquire information about their level of efficacy in achievement situations, has shown that educational practices constitute an important contextual influence on self-efficacy and differ in the type of efficacy information they convey (Schunk, in press-b). In turn, perceptions of self-efficacy affect children's task motivation and skill acquisition.

One common educational practice involves the use of rewards. Rewarding consequences inform and motivate (Bandura, 1977b). As people work at a task, they notice which behaviors lead to desirable outcomes and which result in undesirable ones. Such information guides future behavior. The anticipation of attaining a desired outcome motivates persons to persevere at a task. There is much evidence showing that offering rewards promotes task performance (Dornbush, 1965; Glucksberg, 1962; Goyen & Lyle, 1971; McCullers, 1978; McGraw, 1978).

Reward contingencies are important contextual influences on children's efficacy appraisals (Schunk, in press-b). Rewards should enhance self-efficacy when they are tied to children's actual accomplishments. Telling children that they can earn

rewards based on their level of achievement can instill a sense of efficacy for performing well. As children then work at the task and observe their progress this sense of efficacy is substantiated. Receipt of the reward also validates efficacy because it symbolizes progress. In contrast, children should not experience a heightened sense of efficacy when rewards are offered merely for participating at a task. Such a contingency even could convey negative efficacy information if children inferred that they were not expected to accomplish much because they lacked the requisite capabilities. In support of these ideas, Schunk (in press-a) found that low-achieving children offered performance-contingent rewards during an arithmetic skill-development program demonstrated a higher rate of problem solving and higher levels of self-efficacy and skill compared with subjects offered rewards for task participation and those not offered rewards.

Another common educational practice is the use of goal setting. Goal setting requires comparing one's present performance level to a desired standard. When persons make self-satisfaction contingent on attaining a goal they are likely to sustain their efforts (Bandura, 1977b). Of central importance are goal properties, such as specificity, difficulty level, and proximity (Bandura, 1977b; Latham & Yukl, 1975; Locke, 1968; Locke, Shaw, Saari, & Latham, 1981). Goals that incorporate

specific performance standards lead to higher performance than no explicit or general goals, such as "Do your best" (Locke, 1968; Locke et al., 1981). Assuming that individuals have sufficient ability to accomplish a goal, there is much evidence demonstrating a positive and linear relationship between difficulty level and task performance (Locke et al., 1981). Proximal goals, which are close at hand and can be achieved rather quickly, should result in greater motivation directed toward attainment and a higher level of performance than goals extending farther into the future (Bandura, 1977b, 1982). Proximal goals should be especially influential with children, who have short time frames and may not be fully capable of representing distant outcomes in thought (Schunk & Gaa, 1981).

Proximal goals also can promote self-efficacy (Schunk, in press-b). Suggesting proximal goals to children can convey a sense of efficacy for attaining them. As children later observe their progress toward their goals this sense of efficacy is substantiated, which should sustain motivation and foster skill development. Because progress toward distal goals is more difficult to gauge, children may receive less-clear capability information. These ideas were supported in a recent study (Bandura & Schunk, 1981). Children who pursued proximal performance goals during an arithmetic competency-development program demonstrated the highest rates of problem solving, as well

as the highest level of self-efficacy and skill, compared with subjects who pursued a distal goal and those given no explicit goal.

The preceding considerations suggest some similarity between the hypothesized mechanisms by which performance-contingent rewards and proximal goals promote self-efficacy, task motivation, and skillful performance. Accordingly, the purpose of the present study was to compare the effects of these two contextual influences during a division skill-development program. Some children were offered performance-contingent rewards, others received proximal goals, children in a third condition received both treatments, and those in a fourth group received neither. Compared with the latter condition, children receiving rewards, goals, or rewards + goals were expected to demonstrate higher achievement outcomes. Further, the rewards-only and goals-only conditions were not expected to differ.

Of central interest was how rewards + goals would compare with either treatment alone. For goals to influence performance persons must be committed to attaining them, and there is evidence that offering rewards can strengthen goal commitment (Locke, 1968; Locke et al., 1981). People also are more apt to accept goals when they believe they can attain them (Mento, Cartledge, & Locke, 1980). At the same time, combining rewards with goals should provide a clearer standard against which to gauge progress than

rewards alone. Because these considerations suggest that combining rewards with goals might result in a higher initial sense of efficacy compared with either treatment alone, it was predicted that children in the rewards + goals condition would demonstrate the highest levels of self-efficacy and skillful performance.

Method

Subjects

The sample included 44 children drawn from two elementary schools. Ages ranged from 8 years 11 months to 11 years 4 months (M = 10.1 years). The 27 girls and 17 boys were predominantly middle class. Because this study focused on processes whereby skills could be developed when they initially were lacking, children's teachers were shown the division skill test and identified children who they felt could not solve correctly more than about 25% of the problems. These children were individually administered the pretest by one of four female adult testers.

Pretest

Self-efficacy judgments. Children's perceptions of self-efficacy for solving division problems correctly were measured following procedures of previous similar research (Bandura & Schunk, 1981; Schunk, 1981, 1982, in press-a). The efficacy scale ranged from 10 to 100 in 10-unit intervals from high uncertainty (10), through intermediate values (50-60), to

complete certitude (100). Children initially received practice by judging their certainty of successfully jumping progressively longer distances. In this concrete fashion, children learned the meaning of the scale's direction and the different numerical values.

Following this practice, children were shown 14 sample pairs of division problems for about 2 s each. This brief exposure allowed assessment of problem difficulty but not actual solutions. The two problems constituting each pair were similar to one another in form and operations required, and corresponded to one problem on the ensuing skill test although they involved different numbers. Children privately judged their certainty of being able to solve correctly each type of problem depicted by circling an efficacy value. Thus, children were judging their capability to solve different types of problems and not whether they could solve any particular problem. Self-efficacy scores were summed across the 14 judgments and averaged.

Division skill test. The skill test, which was administered immediately following the efficacy assessment, included 14 division problems ranging from one to three digits in the divisor and two to five digits in the dividend. Half of these problems were similar in form and operations required to some of the problems that children subsequently solved during the training sessions, whereas the other half were more complex. During

training, for example, children had to "bring down" numbers once or twice per problem, whereas some skill test problems required bringing down three numbers.

The tester presented the problems one at a time and verbally instructed children to examine each problem, indicate whether they wished to try to solve it, and place each page on a completed stack when they finished solving the problem or chose not to work on it any longer. Children were given no performance feedback. The measure of skill was the number of problems children solved correctly; small computational errors were discounted.

Training Procedure

Following the pretest, children were assigned randomly within sex and school to one of four treatment groups (*ns* = 11): rewards only, goals only, rewards + goals, training control. Children received two 45-minute training sessions over consecutive school days, during which they worked on two training packets. Each session followed a similar format except that the first covered problems with one-digit divisors whereas the second was devoted to two-digit divisors. The first page in each packet contained a step-by-step worked example that included bringing down one number. The second page contained a practice problem. The next several pages contained problems for children to solve. Sufficient problems were included in each packet so that children could not complete it during the session.

An adult female proctor escorted children individually to a large room where they were seated at sufficient distances from others to preclude visual and auditory contact. Each of the four proctors worked with approximately equal numbers of children in each experimental condition. Initially, the proctor reviewed the explanatory page by pointing to the operations while reading from a narrative that explained the steps. If children indicated a lack of understanding, the proctor reread the relevant narrative but did not supplement it on her own. Children then worked the practice problem, after which the proctor gave the treatment instructions appropriate to the child's experimental condition. The proctor stressed the importance of careful work, and retired to an out-of-sight location. Children solved problems alone and received no performance feedback on the accuracy of their solutions.

During an earlier pilot study, 10 children comparable to the present sample in division skills received the division training but no rewards or goals. These children averaged 20.8 one-digit divisor problems and 10.4 two-digit problems in 45 minutes. These numbers were rounded to 20 and 10 and were used as the goals for the two training sessions, respectively.

Treatment Conditions

Rewards only. At the start of each training session, the proctor informed these children that they would earn five points

for each problem completed because they agreed to participate in the project, and that at the end of the second session they could exchange their points for prizes equal in monetary value to the points. The proctor displayed the prizes, which included magic markers, erasable pens, stickers, and small notebooks. After the second session, the proctor tota ed children's points and they chose prizes.

Goals only. The proctor suggested to these children at the start of the first training session that they adopt a performance goal as follows:

> You might find that you can work these problems best if you try to finish at least 20 problems. Of course, if you do more than 20 problems, that's even better, but you should try to finish at least 20 problems. Does that sound OK to you?

These instructions were repeated at the start of the second session except the proctor indicated 10 problems. No child expressed undue concern over the goals.

Because the reward treatment contained both anticipation and receipt of rewards, these effects were disentangled by allowing goals-only children to choose rewards unexpectedly at the end of the second session. The proctor stated that because they agreed to participate in the experiment they could choose some prizes. To foster the belief of no relationship between training

accomplishments and prizes, children drew a number from a hat. All children drew $1.55, which represented the average number of points accrued by the pilot sample (31 problems x 5 points/problem).

Rewards + goals. These children received both of the above sets of instructions prior to each training session. To half of the children the performance-contingent reward instructions were given first, followed by the goal instructions; this order was reversed for the other half. No child in this condition expressed undue concern over the goals for either session.

Training control. These children were given neither the reward nor the goal instructions. As with goals-only subjects, they were allowed to choose prizes unexpectedly at the end of the second session following the same random-draw procedure.

Expectancy of Goal Attainment

After receiving their treatment instructions, children in the goals-only and rewards + goals conditions judged their expectancy of attaining the goals. Ideally, a measure of goal commitment would have been obtained, because commitment is necessary to promote performance (Locke et al., 1981); however, attempts to assess commitment have been fraught with methodological problems, and subjects often cannot make fine discriminations in degree of commitment (Locke et al., 1981). Expectancy of goal attainment was assessed because persons are more likely to accept goals when

they have higher expectations of attainment (Mento et al., 1980). The scale was identical to that used to assess self-efficacy; judgments from the two sessions were averaged. To control for potential effects of making expectancy judgments, children in the other two conditions judged their certainty of, "Doing your best". These latter judgments did not differ ($t < 1.0$), and have no particular relevance to the present study.

Posttest

The posttest was administered the day after the second training session. Children were informed that rewards would not be given. The instruments and procedures were similar to those of the pretest except that a parallel form of the skill test was used to eliminate possible problem familiarity. The parallel form was developed during a pilot study of previous research (Schunk, 1982), in which the two forms were administered in counterbalanced order to 15 children comparable to the present sample. Their scores on the two forms were highly correlated, $r = .86$, $p < .01$.

For any given child, the same tester administered both the pre- and posttests, had not served as the child's training proctor, and was blind to the child's treatment condition. All tests and training materials were scored by an adult who was unaware of children's experimental assignments.

Results

Means and standard deviations of all measures are presented by experimental condition in Table 1. Preliminary analyses of variance revealed no significant differences due to tester, school, or sex of child on any pre- or posttest measure, nor any significant interactions. The data therefore were pooled across these variables. There also were no significant differences between experimental conditions on any pretest measure. Separate 2 (Performance-Contingent Rewards: yes-no) x 2 (Proximal Goals: yes-no) analyses of covariance were performed on each posttest measure using the appropriate pretest measure as the covariate. Significant F ratios were analyzed further using the Newman-Keuls multiple comparison test (Kirk, 1968).

Insert Table 1 about here

The use of analysis of covariance necessitated demonstration of slope homogeneity across treatment conditions (Kerlinger & Pedhazur, 1973). Tests of slope differences for each measure were made by comparing a linear model that allowed separate slopes for the four experimental conditions against one that had only one slope parameter for estimating the pre-posttest relationship pooled across the four conditions. These analyses found the assumption of homogeneity of slopes to be tenable.

Skill

Analysis of covariance yielded significant main effects for Performance-Contingent Rewards, $F(1, 39) = 14.87$, $p < .001$, and Proximal Goals, $F(1, 39) = 13.09$, $p < .01$. Post-hoc comparisons showed that rewards + goals children exhibited significantly ($p < .01$) higher division skill than training-control subjects, as well as children in the rewards-only and goals-only conditions ($ps < .05$). The latter two conditions did not differ but each demonstrated significantly ($ps < .05$) higher skill than the training-control condition.

Self-Efficacy

ANCOVA yielded significant main effects for Performance-Contingent Rewards, $F(1, 39) = 10.79$, $p < .01$, and Proximal Goals, $F(1, 39) = 13.97$, $p < .01$. Post-hoc comparisons revealed a significantly higher level of efficacy for rewards + goals children compared with training-control subjects ($p < .01$), as well as rewards-only and goals-only children ($ps < .05$). Although the latter two groups did not differ, each judged themselves significantly ($ps < .05$) more efficacious than training-control subjects.

Training Progress

To determine whether rewards and goals led to more rapid problem solving during training, the number of problems completed was analyzed using ANOVA. A significant main effect was obtained

for Performance-Contingent Rewards, $F(1, 40) = 6.42$, $p < .05$. Newman-Keuls comparisons revealed nonsignificant differences between the rewards-only, goals-only, and rewards + goals conditions; however, each of these groups solved significantly ($p < .05$) more problems than training-control subjects. These higher problem-solving rates were not attained at the expense of accuracy. A similar pattern of results was found using the number of problems solved correctly.

Correlational Analyses

Correlational analyses were conducted to explore the interrelationship of theoretically relevant variables. Initially, product-moment correlations were computed among the posttest variables and training progress (number of problems completed) separately for each experimental condition. Because there were no significant between-group differences, correlations were averaged across conditions using an r to z transformation (Edwards, 1976).

Children's perceptions of self-efficacy bore a positive relationship to subsequent skillful performance, $r(42) = .76$, $p < .001$. More rapid problem solving during training was associated with higher self-efficacy, $r(42) = .50$, $p < .01$, and skillful performance, $r(42) = .31$, $p < .05$. The same pattern of results was obtained using the number of problems solved correctly as the measure of training progress.

Expectancy of Goal Attainment

The goals-only and rewards + goals conditions differed significantly on this measure, $t(20) = 3.34$, $p < .01$. Compared with goals-only subjects, rewards + goals children held significantly higher initial expectations for goal attainment.

Discussion

The present study demonstrates that offering children performance-contingent rewards or suggesting proximal goals exerts motivational effects on subsequent problem solving, which is consistent with theory and previous research (Bandura, 1977b; Bandura & Schunk, 1981; McGraw, 1978; Schunk, in press-a). Offering rewards or suggesting goals also promoted self-efficacy and subsequent skillful performance. These two contextual influences may enhance self-efficacy according to a common informational process. Thus, telling children that they can earn rewards based on their actual accomplishments or suggesting proximal goals implicitly conveys that they can perform well, which raises their initial level of self-efficacy. This sense of efficacy is substantiated later as children observe their actual task progress. Receipt of a reward further validates self-efficacy, as does goal attainment or even a close approximation. In contrast, when children receive no reward or goal information they should not experience a comparable initial sense of self-efficacy. As they subsequently work at the task they might wonder how capable

they really are. Such self-doubts can interfere with skill acquisition.

This study also shows that combining performance-contingent rewards with proximal goals led to the highest levels of self-efficacy and skillful performance. Compared with goals alone, rewards + goals may have engendered a greater degree of goal commitment (Locke, 1968; Locke et al., 1981), which should have produced a correspondingly higher sense of efficacy prior to solving problems during training. This initial sense of efficacy likely was validated as children observed their goal progress and received their rewards. This explanation is supported by the finding that rewards + goals children judged themselves more certain of attaining their goals than goals-only subjects. Individuals are more apt to accept goals when they believe that they can attain them (Mento et al., 1980).

Combining rewards with goals should have provided a clearer standard against which to gauge progress compared with rewards alone. Knowledge that one is making progress helps validate an initial sense of efficacy (Bandura, 1982). A clear standard against which to assess progress may be especially important for promoting self-efficacy among young children, who otherwise may not be fully aware of how well they are performing (Schunk & Gaa, 1981).

Previous research in achievement situations where self-efficacy is developed largely through self-performances has shown that efficacy judgments are not mere reflections of those performances (Bandura & Schunk, 1981; Schunk, 1981, 1982). The present study supports this finding, because children in the rewards-only, goals-only, and rewards + goals conditions did not differ in their rates of problem solving during training but rewards + goals subjects subsequently judged efficacy higher.

The present study also supports the idea that self-efficacy bears an important relationship to subsequent achievement (Schunk, 1981, 1982, in press-a). Covington and Omelich (1979) found that adults' personal expectations of successful performance were one of the best predictors of later performance. Personal expectations for success are viewed as important influences on behavior by a variety of theoretical approaches (Bandura, 1982; Covington & Beery, 1976; Kukla, 1972; Moulton, 1974; Schunk, in press-b; Weiner, 1979).

This research has implications for teaching practice. Establishing proximal goals for children fosters achievement outcomes. Goal setting fits well with normal lesson planning, because teachers plan activities around blocks of time. Especially with young children, these activities tend to be short-term. Goal-setting procedures easily can be implemented in classrooms and can enhance school achievement (Gaa, 1973).

The present study also suggests that teachers who regularly dispense rewards would be well advised to link them clearly to children's progress toward goal attainment to maximize achievement outcomes. Teachers who wish to avoid using rewards may need to provide children with explicit information indicating that goals are attainable. Such information should be most important during the early stages of skill acquisition when children lack task experience and knowledge of what they are capable of doing.

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Table 1

Pre- and Posttest Means (and Standard Deviations)

		Experimental Condition			
Measure	Phase	Rewards Only	Goals Only	Rewards + Goals	Training Control
Skill[a]	Pretest	0.9 (1.0)	0.8 (1.0)	1.0 (1.1)	0.8 (1.0)
	Posttest	6.2 (2.9)	5.9 (2.7)	9.2 (2.7)	3.1 (2.8)
Self-Efficacy[b]	Pretest	43.5 (26.0)	41.9 (21.3)	43.5 (15.4)	38.8 (12.0)
	Posttest	60.8 (20.7)	62.0 (20.4)	80.6 (17.8)	45.5 (16.8)
Training Progress[c]	Attempted	38.6 (17.2)	35.9 (14.4)	42.4 (18.1)	21.5 (15.3)
	Correct	34.3 (17.1)	32.4 (15.6)	36.9 (20.9)	15.6 (14.7)
Goal Attainment[d]	---	---	51.6 (14.1)	75.2 (15.8)	---

Note. N = 44; ns = 11.

[a]Number of correct solutions on 14 problems.

[b]Average judgment per problem; range of scale 10 (low) - 100.

[c]Number of problems.

[d]Range of scale 10 (low) - 100.